

REMARKS

Claims 1-25 are pending in the present application. Claims 1-7, 20, 22 and 24 are withdrawn from consideration. Claims 8-19, 21, 23 and 25 are rejected. Claims 8, 9, 10, 21 and 23 are herein amended. No new matter has been added.

Claim Rejections – 35 U.S.C. 102

Claims 8, 16-17, 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Xia et al. (U.S. Patent No. 6,153,261).

The Examiner notes that Xia et al. teaches a method for depositing a silicon nitride film (SiN) using process gases including bistertiarybutylaminosilane (BTBAS) precursor, molecular nitrogen (N₂) and ammonia (NH₃) (see column 10, lines 44-67).

The Examiner appears to consider that the BTBAS precursor of Xia et al. corresponds to a first raw material (a compound containing at least silicon and nitrogen) of the present invention, molecular nitrogen (N₂) of Xia et al. corresponds to a second raw material (a compound containing a plurality of nitrogen atoms in a molecule) of the present invention, and ammonia (NH₃) of Xia et al. corresponds to a third raw material of the present invention.

However, Applicants respectfully disagree with the Examiner's assertion regarding the second raw material. The second raw material of the present invention is a compound containing a plurality of nitrogen atoms in a molecule. On the other hand, the molecular nitrogen (N₂) of Xia et al. is not a compound. Applicants note that the term "compound" means a substance formed from two or more elements chemically united in fixed proportions, the elements being

different from each other. The molecular nitrogen (N_2) is formed from only one element (nitrogen). Therefore, the Examiner's acknowledgement regarding the second raw material is incorrect.

Applicants herein amend claim 8 to ensure that such a definition is impossible.

The present invention is characterized in that the silicon nitride film etc., are formed by using a first raw material of a compound containing silicon and nitrogen and a second raw material of a compound containing a plurality nitrogen atoms in a molecule. Using the second raw material containing a plurality of nitrogen atoms in a molecule make it easier to provide the nitrogen source, make the reaction rate higher. Therefore, in the present invention, it is possible to form silicon nitride film, etc. at relatively low film forming temperatures. Xia et al. neither discloses nor suggests such feature of the present invention.

As described above, the present invention is clearly different from Xia et al.

Claims 8-11, 15-17, 19 and 21 are rejected under 35 U.S.C. §102(e) as being anticipated by Arghavani et al. (U.S. Patent Application Publication No. 2004/0033677 A1).

The Examiner states that Arghavani et al. teaches a method for forming a silicon nitride layer (342) using bistertiarybutylaminosilane (BTBAS) precursor, molecular nitrogen (N_2) and ammonia (NH_3) (see paragraph 0026).

The Examiner seems to consider that the BTBAS precursor of Arghavani et al. corresponds to the first raw material (a compound containing at least silicon and nitrogen) of the present invention, molecular nitrogen (N_2) of Arghavani et al. corresponds to the second raw

material (a compound containing a plurality of nitrogen atoms in a molecule) of the present invention, and ammonia (NH₃) of Arghavani et al. corresponds to the third raw material of the present invention.

However, as described above, the second raw material of the present invention is a compound containing a plurality of nitrogen atoms in a molecule. On the other hand, the molecular nitrogen (N₂) of Arghavani et al. is not a compound. Therefore, the Examiner's acknowledgement regarding the second raw material is incorrect.

As described above, the present invention is characterized in that the silicon nitride film etc., are formed by using a first raw material of a compound containing silicon and nitrogen and a second raw material of a compound containing a plurality nitrogen atoms in a molecule. Using the second raw material containing a plurality of nitrogen atoms in a molecule make it easier to provide the nitrogen source, make the reaction rate higher. Therefore, in the present invention, it is possible to form silicon nitride film, etc. at relatively low film forming temperatures. Arghavani et al. neither discloses nor suggests such feature of the present invention.

Therefore, the present invention is clearly different from Arghavani et al.

Claim Rejection – 35 U.S.C. §103

Claims 12 is rejected under 35 U.S.C. §103(a) as being unpatentable over Arghavani et al., and further in view of Moore (U.S. Patent Application Publication No. 2002/0111039 A1).

The Examiner admits that Arghavani et al. does not disclose a step of burying an interconnection in a further another insulation film.

The Examiner states that Moore discloses a step of burying a conductive plug 130 in the contact opening 124 (see FIG. 4 and paragraph 0034).

As described above, the present invention is characterized in that the silicon nitride film etc., are formed by using a first raw material of a compound containing silicon and nitrogen and a second raw material of a compound containing a plurality nitrogen atoms in a molecule. These references neither disclose nor suggest such feature of the present invention.

Claims 13-14 are rejected under 35 U.S.C. §103(a) as being unpatentable over Xia et al., and further in view of Huang et al. (U.S. Patent 6,077,769).

The Examiner admits that Xia et al. does not disclose a step of forming an interconnection in a further another insulation film.

The Examiner states that Huang et al. discloses a step of forming an interconnection 130 in a further another insulation film 124.

As described above, the present invention is characterized in that the silicon nitride film, etc., are formed by using a first raw material of a compound containing silicon and nitrogen and a second raw material of compound containing a plurality of nitrogen atoms in a molecule. These references neither disclose nor suggest such feature of the present invention.

Claim 18 is rejected under 35 U.S.C. §103(a) as being unpatentable over Xia et al., and further in view of Luo et al. (U.S. Patent Application Publication No. 2003/0059535 A1).

The Examiner states that Xia et al. does not teach or suggest using a hydrazine compound or an azido compound as the second raw material.

The Examiner states that Luo et al. teaches that hydrazine can be used as an alternative nitrogen source to ammonia for depositing SiN layers (see paragraphs 0051 and 0052).

The Examiner seems to consider that the ammonia of Xia et al. corresponds to the second raw material of the present invention here.

However, ammonia (NH_3) is a compound containing only one nitrogen atom in a molecule. Ammonia of Xia et al. does not correspond to a second raw material (a compound containing a plurality of nitrogen atoms in a molecule) of the present invention.

The Examiner is confusing the second raw material with the third raw material. Ammonia (NH_3) is the third raw material of the present invention (see claim 16). Applicants submit that there is no equivalent second raw material disclosed in the cited references.

Therefore, the combination of the cited references still fails to teach or suggest all of the limitations of the present invention.

Claim 23 is rejected under 35 U.S.C. §103(a) as being unpatentable over Arghavani et al., and further in view of Lee et al. (U.S. Patent Application Publication No. 2002/0151145 A1).

The Examiner admits that Arghavani et al. does not disclose a step of implanting a dopant with sidewall spacer as a mask. The Examiner states that Lee et al. discloses a step of implanting a dopant with sacrificial spacers 22a, 22b as a mask, and a step of etching the sacrificial spacers 22a, 22b.

As described above, the present invention is characterized in that the silicon nitride film etc., are formed by using a first raw material of a compound containing silicon and nitrogen and a second raw material of a compound containing a plurality nitrogen atoms in a molecule. These references neither disclose nor suggest such feature of the present invention.

Claim 25 is rejected under 35 U.S.C. §103(a) as being unpatentable over Arghavani et al., and further in view of Chatterjee (U.S. Patent Application Publication No. 2003/0102512 A1).

The Examiner admits that Arghavani et al. does not disclose pocket regions. The Examiner states that Chatterjee discloses pocket regions 31.

As described above, the present invention is characterized in that the silicon nitride film etc., are formed by using a first raw material of a compound containing silicon and nitrogen and a second raw material of a compound containing a plurality nitrogen atoms in a molecule. These references neither disclose nor suggest such feature of the present invention.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

Application No. 10/696,775
Attorney Docket No. 032076

Amendment under 37 C.F.R. §1.111

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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